



22058 Patent Application Ser. No. 09/980,571

**APPLICATION OF A VAPOROUS MIST FOR SPINNING SYSTEMS
WITH RECTANGULAR NOZZLES**

SUBSTITUTE SPECIFICATION

CROSS REFERENCE TO RELATED APPLICATIONS

5 This application is a national stage of PCT application PCT/EP00/03390 filed 14 April 2000 and based upon German national application 19920682.1 itself filed 5 May 1999 under the International Convention.

FIELD OF THE INVENTION

10 The present invention relates to the use of steam misting in the production of polyamide filaments, especially for rectangular spinning nozzles in accordance with the bottom loading concept and a spinning system equipped therewith.

15 In the spinning of polyamides, especially for polyamide 6 (nylon 6), during the discharge of the filaments from the spinning nozzles monomers and oligomers in the form of unpleasant smoke clouds are produced which can be released in an uncontrolled manner into the surroundings. In order to prevent this, these emissions can be evacuated via suction nozzles which
20 must be provided as close as possible to the spinneret outlets. The functions and the shapes of such suction nozzles have been made known in DE 198 36 682.5. From DE 198 30 453.6 it is known, further, that superheated steam which serves to moisten the polyamide filaments and to support the suction effect, can

simultaneously increase the wiping interval time for the spinning nozzle when blown directly thereagainst.

Conventional devices which serve for the aforescribed purposes are damaged however during the cleaning or replacement
5 of the nozzles. Thus it has been, for example, proposed at one time to provide the conventional nozzle misting so that the steam is blown onto the longitudinal side of a rectangular nozzle stack centrally against the side wall of the relevant nozzle stack so that it then flows in the gap between the nozzle stack and the
10 nozzle shaft in the spinning beam downwardly and is rerouted by a baffle plate more or less uniformly in the direction of the spinning plate. This device is, apart from the insufficiency of the moisturization produced, not usable for rectangular nozzle stacks in accordance with the bottom loading concept, is
15 effective even to a lesser extent than is the solution for round spinning nozzles from the application DE 198 30 453.6 which differs based upon the after-heater which is directly following and also is not practical.

OBJECT OF THE INVENTION

20 Thus it is the object to provide a reliable apparatus, which is service-friendly and is easy to clean, for the steam moisturization of rectangular nozzles.

SUMMARY OF THE INVENTION

The advantage of the new steam misting resides in the good temperature control of the steam, whereby the steam feed is effected through a tube loop which passes through the heating chamber of the spinning beam so as to bring the steam up to the spinning temperature. Advantageously, the steam outlet bars are directly below the spinning beam and thus on the lower edges of the rectangular nozzle stack connected therewith, between the spinning beam and the after-heater. These steam outlet bars are equipped with a simple labyrinth for pressure equalization which can be fabricated especially inexpensively. The steam inlet is effected initially respectively centrally to the rectangular nozzle stack and into an upwardly open and relatively broad distribution chamber along the rectangular nozzle stack.

This vertical distribution chamber transitions into a horizontal and very narrow gap space which opens into the spinning chamber. As the steam enters into the latter, the steam is spread out and uniformly flows in the direction of the nozzles. This is so effective that a misting from the ends inwardly is superfluous.

BRIEF DESCRIPTION OF THE DRAWING

A more detailed description of the method and the apparatus for steam misting of rectangular nozzles and the spinning system equipped therewith for producing polyamide filaments is provided below in conjunction with the drawings. Thus in the drawings

FIG. 1 shows a section through a spinning beam into which the unit for steam misting of the invention is built;

FIG. 2 shows a detail section of the steam misting unit in its assembled state; and

FIG. 3 shows a detail section of the steam misting unit in the disassembled state.

SPECIFIC DESCRIPTION

FIG. 1 shows an exemplary spinning system. The section is through a spinning beam 1 with rectangular nozzles 2, its insulation 3 and the after-heater 4 as well as the monomer suction 5. Below the spinning beam one can see the blowing device 6 and here also is represented the filament curtain 7 in the spinning chamber 8 of the after-heater 4. The steam feed is effected via a pipe loop 9 which extends through the heating chamber 10 of the spinning beam 1 so that already superheated steam is brought further to the spinning temperature. Directly below the spinning beam 1 and thus on the lower edge of the rectangular nozzle stack 2 which is connected thereto, between the spinning beam 1 and the after-heater 4, on a longitudinal

side - and with very wide spinning stacks on both sides - steam outlet bars 11 are provided which are each comprised of a base bar 12 and a distributor bar 13 forming together with the lower edge of the spinning beam 1 a labyrinth distribution chamber 14 which is described in greater detail below. The ends of the rectangular nozzle stack 2 do not need to be sprayed with steam however in any case.

In FIG. 2, the steam outlet bar 11 for the steam misting has been shown in a detail section in its assembled state, i.e. ready for operation and fixed between the spinning beam 1 and the after-heater 4. These steam outlet bars 11 are equipped with a simple labyrinth distribution chamber 14, for pressure equalization. This labyrinth-like distribution chamber 14 is laterally bounded by the base bar 12 and from above by the lower edge of the spinning beam 1 and itself can be formed mainly from cutouts 15, 16 in the distributor bar, forming a vertical distribution chamber 15 and a horizontal gap 16. From the pipe loop 9 the steam is introduced at 19 initially respectively centrally through the base bar 12, i.e. also centrally with respect to the rectangular nozzle stack 2 and opens into the upwardly open and relatively broad distribution chamber 15 longitudinally into the distribution bar 13. This vertical passage 15 transitions on into a horizontal, very small gap 16 which opens into the spinning chamber 8. From this passage 16 the steam then flows in the direction of the nozzles transversely to the filament curtain 7.

FIG. 3 shows a steam outlet bar 11 in its disassembled state. On the base part 12 one can see the steam inlet 19 and the end of the tube loop 9 opening into it as well as the two fastening screw threads 17 for the distributor bar 13. On the distributor bar 13 one can recognize the screw hole 18 and the openly accessible cutouts 15, 16 for cleaning, namely, the vertical distribution chamber 15 and the narrower horizontal gap 16 which form the steam distribution labyrinth 14 once the device is completely assembled as has already been described.

The steam misting system is primarily conceived for use in apparatus for the spinning of high-strength polyamide yarns, but it can however be used universally wherever a spinning outlet surface is to be misted with steam or a moist spinning atmosphere is to be obtained. The use is therefore not limited only to bottom-loading spinning systems.

The pressure equalizing and labyrinth-light distribution chambers can respectively be provided on both longitudinal sides of the rectangular nozzle stack. The first passage 15, i.e. the larger passage, can have two to a maximum of five times greater rectangular cross section in the subsequent second passage 16.